

AMENDMENT UNDER 37 C.F.R. § 1.111

Application No.: 09/677,188

Atty Docket No.: Q56451

**REMARKS**

The Office Action of February 23, 2004 has been received and its contents carefully considered.

Claims 1 to 12 are all the claims pending in the application, prior to the present amendment.

The Examiner has not acknowledged applicants' claim to domestic priority based on a provisional application. Applicants request the Examiner to make such an acknowledgment.

Claims 1, 2, 4-8 and 10-12 have been rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent 5,541,096 to Nomura et al.

In addition, claims 3 and 9 have been rejected under 35 U.S.C. § 103(a) as obvious over Nomura et al and further in view of U.S. Patent 6,342,128 to Tabatabaie-Raissi et al.

Applicants submit that Nomura et al and Tabatabaie-Raissi et al do not disclose or suggest the present invention as set forth in the amended claims and, accordingly, request withdrawal of these rejections.

The present invention as set forth in claim 1 as amended above, is directed to a composite structure having a photocatalytic function which can be used for deodorization and wastewater treatment, comprising a foamed or porous substrate having apparent specific gravity of 0.9 to 0.01 and finely divided titanium oxide particles having an average particle diameter of 0.005  $\mu\text{m}$  to 0.3  $\mu\text{m}$  which are adhered onto the surface of the foamed or porous substrate.

In another aspect, the present invention as set forth in claim 7 as amended above, is directed to a method for deodorizing gas having offensive odor or treating wastewater,

AMENDMENT UNDER 37 C.F.R. § 1.111

Application No.: 09/677,188

Atty Docket No.: Q56451

comprising the step of allowing gas having offensive odor or wastewater to be in contact with a composite structure having a photocatalytic function, which comprises a foamed or porous substrate having apparent specific gravity of 0.9 to 0.01 and finely divided titanium oxide particles having an average particle diameter of 0.005  $\mu\text{m}$  to 0.3 $\mu\text{m}$  which are adhered onto the surface of the foamed or porous substrate, whereby smelly or harmful substances contained in the gas or wastewater are decomposed.

Thus, applicants have amended independent claims 1 and 7 to recite the average particle size of the titanium dioxide particles as being 0.005  $\mu\text{m}$  to 0.3  $\mu\text{m}$ . The basis for the amendments in claims 1 and 7 is found on page 4, lines 7-12, of the specification.

In addition, applicants have amended claims 5 and 11 to change their claim dependency and thereby provide antecedent basis for the recitations of these claims.

Further, applicants have amended claim 12 to recite additional materials for the substrate. Support for this amendment can be found on page 6, lines 22-25.

Still further, applicants have added new claims 13 and 14, support for which is found in the paragraph spanning from page 7 and page 8, new claim 15, support for which is found on page 8, lines 15-16, and new claims 16 and 17, support for which is found on page 6, bottom.

The composite structure of the present invention set forth in claim 1 and employed in the method of claim 7 is characterized in that finely divided titanium oxide particles having an average particle diameter of 0.005  $\mu\text{m}$  to 0.3  $\mu\text{m}$  are adhered onto the surface of a foamed or porous substrate having an apparent specific gravity of 0.9 to 0.01.

AMENDMENT UNDER 37 C.F.R. § 1.111

Application No.: 09/677,188

Atty Docket No.: Q56451

The recitation in claims 1 and 7 of finely divided titanium oxide particles having an average particle diameter of 0.005  $\mu\text{m}$  to 0.3  $\mu\text{m}$  is broader than the subject matter (0.05  $\mu\text{m}$  to 0.3  $\mu\text{m}$ ) of cancelled claims 3 and 9, which have been rejected as obvious over Nomura et al in view of Tabatabaie-Raissi et al.

Nomura et al disclose a process for purification of water by employing a photocatalyst comprised of inorganic porous particles having photosemiconductor particles deposited on at least a part of the surfaces of the inorganic porous particles and at least a part of the walls of pores and/or voids thereof. See column 3, lines 44 to 45 and lines 55 to 58.

The photosemiconductor particles can be titanium oxide particles. See column 4, lines 25 to 37.

Nomura et al disclose at column 5, lines 15-18 that the photocatalysts can have an apparent specific gravity of not higher than 1, which allows the photocatalyst to disperse in the water to be treated or to float on the surface thereof. Applicants point out, however, that Nomura et al teach that an apparent specific gravity of higher than 1 allows the photocatalysts to be settled and immobilized on the bottom of a water-existing region rendering, preferably, the photocatalysts less releasable from the region.

Nomura et al specifically disclose in the working examples only photocatalysts having an apparent specific gravity of 1.0 (Example 1; column 6, lines 56-57) and 1.2 (Example 2; column 8, lines 2-3), and are silent on photocatalysts having an apparent specific gravity of 0.01 to 0.9 in the working examples. Nomura et al nowhere disclose an apparent specific gravity of 0.9 to 0.01.

AMENDMENT UNDER 37 C.F.R. § 1.111

Application No.: 09/677,188

Atty Docket No.: Q56451

Further, applicants submit that Nomura et al do not disclose the apparent specific gravity of the inorganic porous particles themselves. Thus, Nomura et al disclose the apparent specific gravity of the photocatalysts, that is, a combination of inorganic porous particles with photosemiconductor particles, but are silent on the apparent specific gravity of the inorganic porous particles themselves, on which the photosemiconductor particles are deposited.

In addition, the Nomura et al patent does not specifically disclose the particle size of the titanium dioxide particles.

The Examiner relies on the disclosure of Tabatabaie-Raissi et al, at column 22, lines 58 to 63, of titanium dioxide particles of less than 0.1 microns, preferably less than 0.02 microns, for use as a photocatalytic particle. The Examiner argues that it would have been obvious to employ such particles in the photocatalyst of Nomura et al.

Tabatabaie-Raissi et al disclose in Example 2 titania particles having a particle size smaller than 0.1  $\mu\text{m}$ , preferably less than 0.02  $\mu\text{m}$  that are bonded to a base polymeric material.

Nomura et al and Tabatabaie-Raissi et al, however, suggest nothing about a combination of titanium oxide particles having an average particle diameter of 0.005  $\mu\text{m}$  to 0.3  $\mu\text{m}$  with a foamed or porous substrate having an apparent specific gravity of 0.9 to 0.01. Further, Nomura et al and Tabatabaie-Raissi et al do not disclose or suggest that UV irradiation efficiency is increased and enhanced deodorization and wastewater-treating capacity can be obtained by the specified combination of the particle diameter with the apparent specific gravity.

AMENDMENT UNDER 37 C.F.R. § 1.111

Application No.: 09/677,188


Atty Docket No.: Q56451

In view of the above, applicants submit that Nomura et al and Tabatabaie-Raissi et al do not disclose or suggest the subject matter of the present claims and, accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

  
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